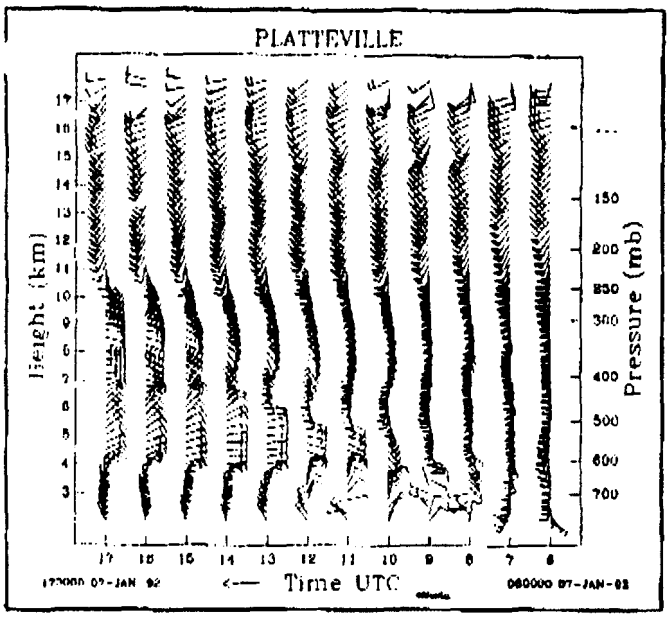


Fig 2—A 12-hour plot from the wind profiler at Platteville, Colorado. The plot shows wind speed and direction from 0 to 19 km above the site. See text for details.

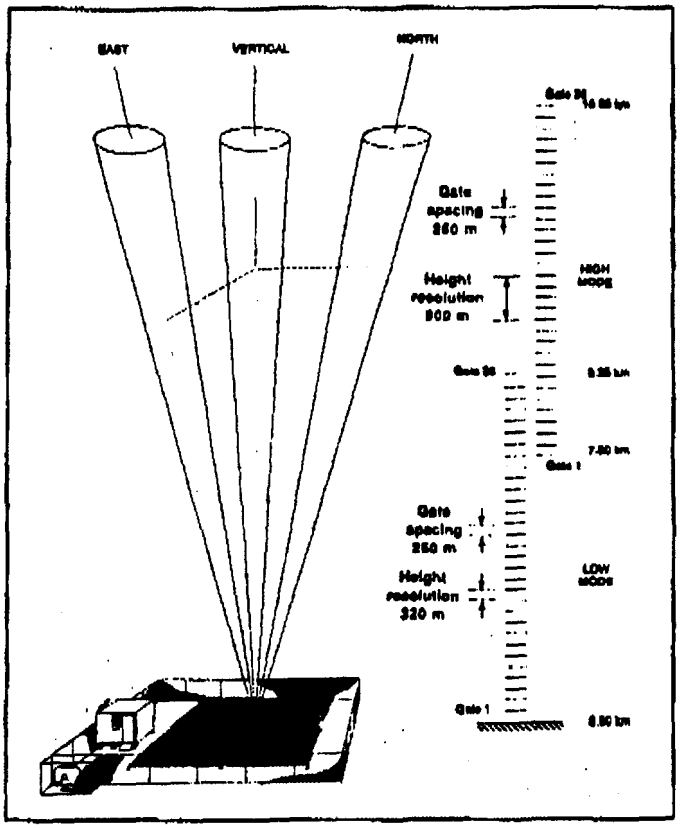


Fig 3—A typical wind profiler radar emits one vertical and two nearly vertical beams from its 40 × 40-foot collinear array. See text for details.

craft instruments for medium-range forecasts. Other possible applications are for aircraft routing and clear-air turbulence prediction, missile launch support, and to track volcanic ash, pollution, hurricanes and tornadoes.

The wind profiler produces hourly measurements of winds from 500 m to 16.25 km (1640 to 53,300 ft) above the ground. Fig 2 shows 12 hourly wind profiles from Platteville, Colorado, on January 7, 1992. Time is plotted from right to left. The wind barbs, which look like miniature weather vanes, indicate the direction and speed of the wind as a function of height and time. A half-barb represents a 5-knot wind speed, a full barb is 10 knots, and a triangular flag represents 50 knots. This case shows the shift in wind direction associated with a weather front passing over the profiler. It is this type of detailed, continuous, and real-time wind observations that holds the promise of more accurate weather monitoring and prediction.

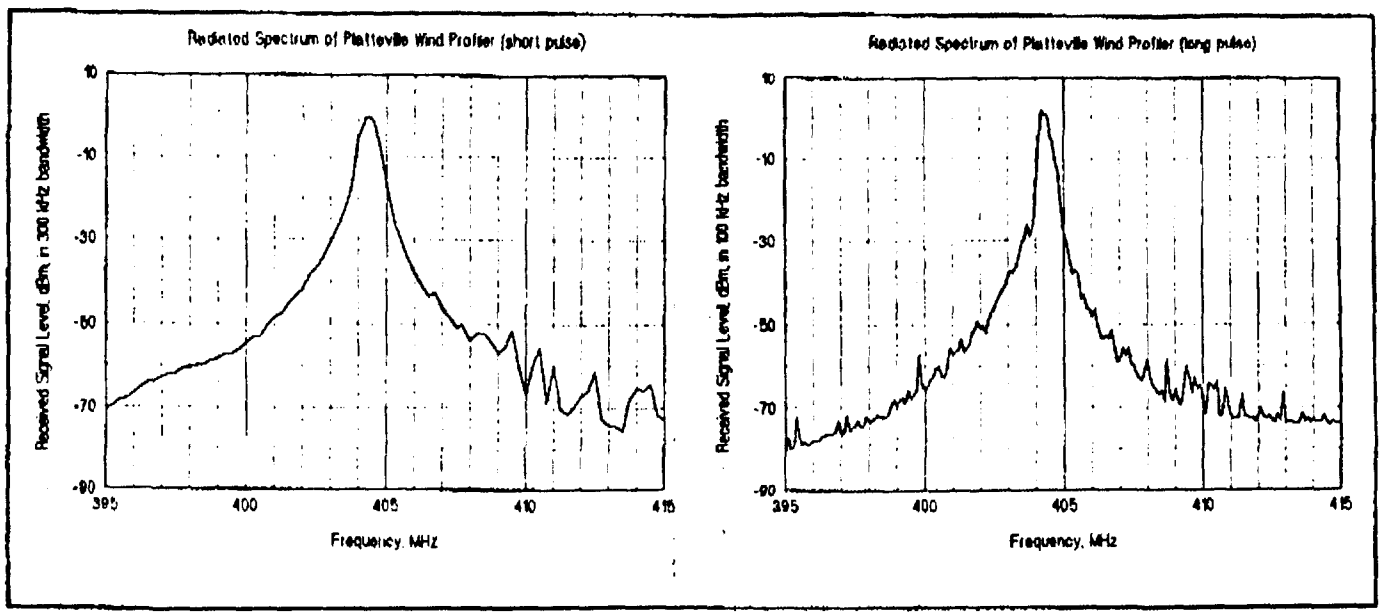
Transmission Characteristics and Interference Issues

The profiler transmits and receives signals sequentially in one vertical and two near-vertical beams from a 40 × 40-foot phased array of horizontally polarized, coaxial-collinear antenna elements as illustrated in Fig 3. Table 1 lists the radar's characteristics. The radiated power is not particularly high by ground-based radar standards, and the −25 dBi measured antenna gain at low elevation angles minimizes radiated power in the horizontal direction. The impressive system noise power and minimum detectable signal levels are due to careful antenna and receiver design and digital signal processing. The high level of sensitivity required to detect the extremely weak radar returns makes the profiler vulnerable to interference from co-channel sources. Because of the use of inter-pulse and intra-pulse phase coding and signal processing, an interfering signal, such as an FM voice transmission, will effectively raise the operating noise level rather than produce erroneous Doppler signals. Because radar returns typically fall off with range, this degradation of the signal-to-noise ratio results reduced profiler altitude coverage.

The radiated spectra for the low and high modes are shown in Figs 4 and 5, respectively. Minimum-shift keying (MSK) phase coding is used to reduce the spectral width at the expense of range resolution. The profiler also employs a pulse-to-pulse pseudo-

Table 1
Wind Profiler Specifications

	Unit	*Low Mode*	*High Mode*
Operating Frequency	MHz	404.37	404.24
Height Coverage			
Minimum	km	.50	7.50
Maximum	km	9.25	16.25
Transmit Power			
Peak (nominal)	kW	8.7	11.8
Average (nominal)	W	300.0	1500.0
Pulse Width			
Coded	s	3.33	20.00
Decoded	s	1.67	6.67
Pulse Repetition Time			
Vertical Beam	s	96.667	148.333
Oblique Beams	s	100.691	154.614
Receiver Noise Temp.	K	37	37
System Noise Power			
Vertical Beam	dBm	−142	−144
Oblique Beams	dBm	−141	−142
Minimum Detectable Signal			
Vertical Beam	dBm	−170	−173
Oblique Beams	dBm	−170	−171
Antenna Characteristics (all beams)			
On-axis Gain			≤ 32 dBi
One-way −3 dB Beamwidth			≥ 5°
Low-elevation Peak Side Lobe (relative to main beam)			< −40 dB



Figs 4 and 5—Radiated spectra for the wind profiler's low and high modes, respectively. See text for details.

random phase code which reduces range-ambiguous signal returns, also known as multiple-trip echoes. A side effect of this coding is a wealth of spectral lines inside the envelopes shown in the figures. A nearby FM receiver tuned to the profiler frequency detects a tone rich in harmonics that switches pitch once each minute as the profiler alternates between its high and low modes of operation.

Siting and Coordination

To avoid man-made electrical noise, wind profilers are typically located away from metropolitan areas and high-voltage electrical lines. The locations are also chosen to minimize ground clutter from mountains and moving clutter from airplanes and automobiles. There is usually some flexibility in the exact profiler location and antenna orientation. A recent NTIA report (NTIA TR 91-280) concludes that a separation between the profiler and an amateur repeater station of 50 km is required for compatibility. NOAA is planning measurements to verify this figure. In addition, the profiler antenna may be oriented to minimize power in the direction of the repeater. It is also possible to modify the profiler perimeter fence to reduce horizontal radiation. The profiler siting procedures involve a desk survey and RF tests at candidate sites. Coordination steps can be initiated early in the profiler siting stage.

Summary

Although 449-MHz profilers have not been specified yet, their characteristics should be similar to those described above. Techniques for side-lobe reduction and interference detection and mitigation are continually being developed. There appear to be solutions to the technical issues concerning shared use of the 449-MHz band between government agencies and the Amateur Radio community. QST

Strays

HAMMING IN UKRAINE

☐ In Malaga-Torremolinos, Spain, WARC-92 delegate George Amerkhanjan of the State Ministry of Communications, Ukraine, said that several US amateurs had shown up at his office seeking permission to operate ham radio. He expects more this summer and is willing to accommodate American hams, but would like a letter from the ARRL in advance. If you plan to operate in Ukraine, please provide the League's Regulatory Information Branch (RIB) with details on when and when you wish to operate, and a copy of your US FCC license 60 days before your departure. RIB will airmail an appropriate letter with a photocopy of your license to the Ministry.—*Paul Rinaldo, W4RI, Editor*

NEW VIDEO

☐ *Your HQ at Work* is a video in which ARRL New Hampshire Section Manager/New England Division Vice Director Warren Rothberg, WB1HBB; Gerald Valcourt, NY1Z; Glen Bellnsky, KA1MLH; Donna Rothberg, KA1RWZ; and Edward Williams, KA1FZD, show a behind-the-scenes look at ARRL HQ. Write to HQ's Educational Activities Department to request order forms and a copy of our AV library rules for borrowing this free-loan VHS tape.

IARU DF CONTEST

☐ The Hungarian Amateur Radio Society and IARU Region 1 will host IARU societies worldwide in the 6th IARU Amateur Radio Direction Finding World Championships September 8-13, 1992. National teams will consist of a maximum of 12 competitors, with three competitors allowed in each category (Women, Old-Timers, Seniors and Juniors). The events will be held in Siófok, near Balaton Lake in Hungary.

RUSSIAN ARES GOES DIGITAL

☐ The Russian Amateur Radio Emergency Service (RARES) received a donation of several MFJ-1278 multimode data controllers for packet, RTTY, AMTOR, CW, SSTV and fax, courtesy of MFJ Enterprises Inc of Mississippi State, Mississippi. They'll be used mainly to set up a network between R3A at the Russian Parliament building and other places. ARRL Field Services Manager Rick Palm, K1CE, coordinated shipment of the devices. Palm was a natural choice to help because of his trip to the Third International Hamvention and Conference in Leningrad (St Petersburg) last August (see "ARES in the USSR," October 1991 *QST*, page 16).

CANADIAN HAM MUSEUM

☐ Canada's only Amateur Radio museum, the Manitoba Amateur Radio Museum, on the grounds of the Manitoba Agricultural Museum in Austin, holds its official opening Thursday, July 23, at 11:30 AM, during the annual Threshermen's Reunion. The Honorable Bonnie Mitchelson, Minister of Culture, Heritage and Citizenship, has been invited to officiate. Volunteer operators are also needed to man the VE4MTR July 22-25 and to demonstrate Amateur Radio to the public. The building will be open from 10 AM-6 PM daily from May to October. Dave Snydal, Secretary/Treasurer/Curator, 25 Queens Crescent, Brandon, MB R7B 1Q1 Canada.